

THE WATERSHED AND STUDY AREA

A. General Description

1. The Watershed. The Flat River drains an area of approximately 560 square miles as it flows through the counties of Montcalm, Ionia and Kent. The mainstream originates in the Six Lakes area and flows approximately 70 miles until it joins the Grand River at Lowell.
2. The Study Area. The area of study included the entire mainstream from Six Lakes to its mouth at the Grand River, Dickerson Creek, its major tributary, as well as the numerous smaller tributaries which make up the system.

B. Physiography and Soils

About 15,000 years ago, most of the watershed was covered with glacial ice. The effects of the glaciation are still evident. The rolling, hilly moraines, flat outwash plains, and kettle lakes are typical features in the watershed.

The Flat River originates at the outfall of First Lake, at an elevation of approximately 915 feet above sea level and drops to an elevation of about 617 feet where it meets the Grand River in Lowell.

The majority of the soils in the upper reaches of the watershed are sandy loams or loamy sands. Around the Langston area along the mainstream, Grayling sands are the general soil feature. Organic soils (muck and peats) are a common feature in the Greenville area with loamy sands or sandy loams the predominant.

Towards the lower reaches of the watershed, the soils are still fairly well drained with loamy soils predominating. The Mancelona-Fox-Boyer association is a predominant association along the Flat mainstream.

C. Stream Characteristics

1. Stream Lengths. The table below summarizes the Flat River system.

Flat River Mainstream	70.0 miles
Wolf Creek	1.2 miles
Townline Creek	3.4 miles
Horseshoe Creek	1.4 miles
Clear Creek (from outfall of Lincoln Lake)	2.2 miles
Butternut Creek	3.8 miles
Cooper Creek	9.2 miles
Wabasis (from outfall of Morgan Lake)	6.9 miles

Dickerson Creek	25.6 miles
Seely Creek	3.9 miles
West Branch Creek	7.1 miles
Unnamed creeks and drains	<u>13.1 miles</u>

TOTAL 147.8 miles

2. Water Quality. All of the waters in the Flat river system are protected for the following:

- a) agriculture
- b) industrial water supply
- c) navigation
- d) public water supply
- e) partial body contact (with the exception, Fallasburg Dam backwater which is protected for total body contact)

Water samples taken at M-21 in Lowell near its confluence with the Grand River indicate that the water quality of the Flat River is within the parameters for which the river is being protected.

In certain areas of the mainstream, heavy spring runoff and nutrients from crop fertilizers contribute to the growth of heavy concentrations of aquatic vegetation. Many of the tributaries making up the Flat River system are often weed choked during the warm summer months.

The table on the following page shows the chemical, physical and biological water analysis for 1974.

The Flat River mainstream starts at the outfall of First Lake in Belvidere Township, Montcalm County. Approximately 1 1/2 miles downstream is the M-66/46 bridge crossing. From this bridge crossing to the Village of Langston, approximately 22 river miles, there are many windfalls and carryovers. This, and the generally low water in the summer months, makes this portion of the mainstream generally unsuitable for canoeing.

Access to the mainstream below Langston may be obtained at the Montcalm County Park along M-91. From this point to the City of Greenville is about nine river miles. At Greenville, the dam must be portaged. Between Greenville and the City of Belding, the river flows through the Flat River State Game Area. At Belding, a second dam must be portaged. About three miles below the dam at Belding, near the Village of Smyrna, a dam has been removed exposing the old log cribs. The swift water at this point offers a challenge to the novice canoeist.

About 5.5 miles further downstream is the Whites Bridge Dam, which must be portaged. At Whites Bridge, one of the two covered bridges in the Flat River system, there are no publicly provided access facilities.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Stream Flow CFS	1130		1610	1250	1050	950	574	411	300	470		
Water Temp C	0.0	0.0	4.0	10.0	12.0	19.0	21.5	21.0	20.0	13.0	9.0	
Dissolved Oxygen mg/1	13.4	12.9	13.3	11.4	9.8	8.3	6.6	7.0	7.4	9.9	9.6	
PH	7.8	7.7	7.8	7.9	8.0	8.5	8.3	8.1	8.1	8.1	8.1	
Nitrate Nitrogen mg/1	.90	.86	.57	.37	.38	.34	.21	.30	.17	.30	.42	
Ammonia mg/1	.19	.14	.03	.02	.04	.02	.11	.02	.02	.05	.06	
Suspended solids mg/1	8	9	8	9	23	8	57	4	7	2	8	
Total phosphorus mg/1	.05	.06	.05	.07	.13	.09	.20	.05	.04	.05	.05	
Otrho-phosphorus mg/1	.03	.03	.01	.01	.03	.05	.03	.02	.02	.03	.02	

Flat River - M-21 Lowell
Water Quality Data 1974

About five miles below Whites Bridge is Fallasburg Park and the second covered bridge. Three miles below Fallasburg Bridge is Burroughs Dam, which must be portaged. This portion of the river runs through the Flat River State Game Area. The fifth dam on the Flat River system is located in the City of Lowell.

D. Vegetation

A high percentage of land adjacent to the Flat River is floodplain. In these areas, the river winds slowly through well-vegetated areas of lowland hardwoods or scattered marsh areas. Dominant vegetation consists of red and silver maple, basswood, and elm. Other species associated with this type are black ash, cottonwood and willow. The areas immediately adjacent to the river are vegetated with red osier dogwood, willow, tag alder and a variety of shrubs and ferns, particularly sensitive fern.

In higher areas along the river, the soils support scattered stands of northern hardwoods composed of hard maple, oak, hickory and beech. In other areas, particularly state game areas, there are numerous pine plantations. Occasional white pine and hemlock are found scattered along the river. These tall conifers are very striking and add greatly to the variety of the riverscape.

E. Climate

The Flat River watershed has a modified continental climate. The prevailing westerly winds cross Lake Michigan, pick up warm, moist air in the winter and cool, moist air in the summer. The result is mild winters and summer cooler than in areas west of the lake.

In Greenville, the approximate center of the watershed, the average frost-free periods lasts from mid-May to early October. Average precipitation is about 29.6 inches per year, and is fairly well distributed throughout the year. The average snowfall is 43 inches. Extremes in temperature have been recorded from a low of -25 F to a high of 108 F.

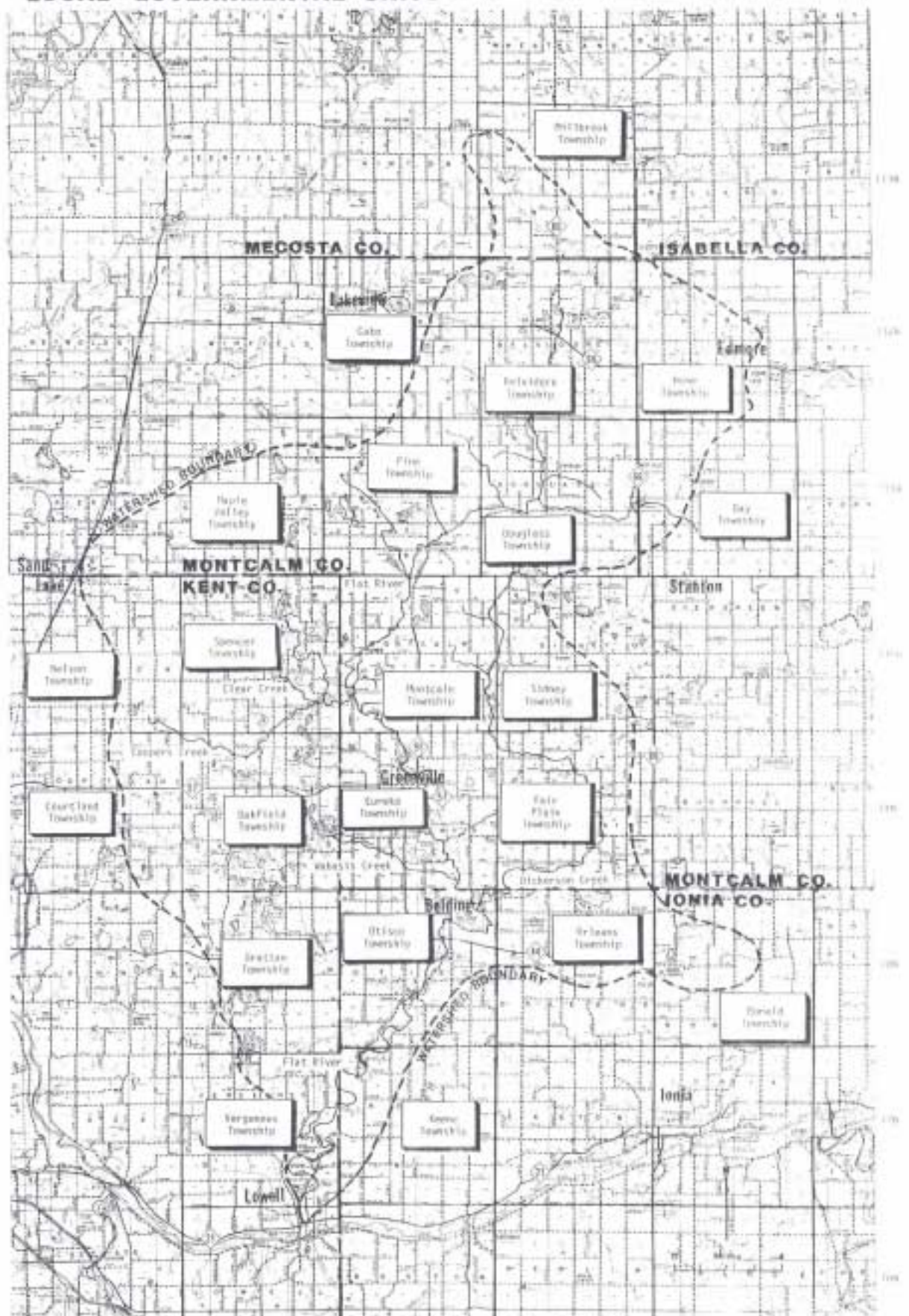
F. Ownership

Ownership along the mainstream is, by and large, private. However, approximately 7.7 percent of the total mainstream frontage is in public ownership. Most of these lands are located in the Langston, Flat River and Lowell state game areas.

The following table is a breakdown of DNR ownership along the mainstream.

Flat River Mainstream (Starting at Six Lakes Outfall)					
County	Township	Length	Frontage	DNR Frontage	Percent
Montcalm	Belvidere	5.9	11.8	0	
	Douglass	6.1	12.2	0	
	Pine	4.5	9.0	1.2	
	Montcalm	11.0	22.0	0	
	Eureka	<u>10.8</u>	<u>21.6</u>	<u>3.6</u>	
		38.3	76.6	4.8	7.1%
Ionia	Otisco	12.2	24.4	2.9	
	Keene	<u>5.7</u>	<u>11.4</u>	<u>1.0</u>	
		17.9	35.8	3.9	10.9%
Kent	Vergennes	8.9	17.8	1.5	
	Lowell	<u>1.3</u>	<u>2.6</u>	<u>0</u>	
		10.2	20.4	1.5	7.4%
Mainstream Total		66.4	132.8	10.2	7.7%

In addition, of the total of 400 linear miles of tributaries and dams, making up the entire Flat River system, roughly 7.6 percent of the stream frontage is managed by the Department of Natural Resources.



Ownership of stream frontage making up the Flat River system by township is summarized below:

Flat River Tributaries

County	Township	Length	Frontage	DNR Frontage	Percent
Montcalm	Home	9.4	18.8	3.8	
	Belevidere	15.3	30.6	0.2	
	Cato	5.1	10.2	0	
	Day	2.5	5.0	0	
	Douglass	10.3	20.6	0	
	Pine	10.1	20.2	8.0	
	Maple Valley	12.9	25.8	0	
	Sidney	7.1	14.2	0	
	Montcalm	6.8	13.6	0	
	Fairplain	17.6	35.2	9.1	
	Eureka	5.0	10.0	3.6	
		102.1	204.2	24.7	12.1%
Ionia	Orleans	9.9	19.8	3.8	
	Otisco	<u>15.1</u>	<u>30.2</u>	<u>1.6</u>	
		25.0	50.0	5.4	10.8%
Kent	Spencer	25.7	51.4	0	
	Nelson	4.9	9.8	0	
	Oakfield	15.3	30.6	0	
	Grattan	16.3	32.6	0	
	Vergennes	<u>11.0</u>	<u>22.0</u>	<u>0</u>	
		73.2	146.4	0	0%
Tributaries Total		200.3	400.6	30.1	7.6%
	Mainstream	66.4	132.8	10.2	7.7%
	Tributaries	<u>200.3</u>	<u>400.6</u>	<u>30.1</u>	<u>7.6%</u>
	Total	266.7	533.4	40.3	7.6%

G. Accessibility

Highway access to the Flat River is good. There are a number of state and interstate highways that go through or pass near the region. Interstate I-96 borders the area on the South; M-66 borders the eastern portion of the watershed; M-46 the northern portion; M-21, which parallels I-96 borders the southern portion of the watershed; two east-west routes run through the watershed, M-57 and M-45; and M-91, a north-south arterial, roughly divides the watershed in two.

Excluding road bridges in incorporated cities and villages, the river is crossed 25 times on the mainstream. There are eight railroad bridges crossing the mainstream.

EXISTING USES AND RECREATIONAL OPPORTUNITIES

A. Land Use

The Flat River watershed is situated in the rural areas of Ionia, Montcalm and Kent counties. Based on available information from these counties, the major land use of the area is agriculture which utilizes 780,700 acres (57%) of the available 1,386,240 acres. Of the total acreage in agriculture, 63.8% is harvestable crops, the remaining acreage is utilized for pasture or lies idle.

The second largest land use is forestland which accounts for 325,800 acres or 23% of the land area. Although much of the forestland is in small woodlots, considerable acreage lies within the boundaries of the state game areas in the watershed. Timber harvest is not a major industry in the watershed, but figures show that 99% of the small woodlots are commercially harvested.

Based strictly on county figures, recreational uses make up only about 3% of the land area. However, this figure would be considerably higher when one considers the recreational use derived from forested areas and the allowed hunting on agricultural acreage.

B. Private Recreation Facilities

There are 21 private campgrounds within the Flat River watershed which provide 1,194 sites to the camping enthusiast. Most of these are located on the western edge of the watershed, in eastern Kent County. There presently exists only two canoe liveries which offer 25 canoes for rent on the Flat River.

The Flat River Historical Society has developed the Flat River Museum in the Old Ridley Warehouse site in the City of Greenville. The museum is open to the public and includes displays on the lumbering era, the geography and geology of the watershed, farming tools and household goods, businesses of the watershed, and archives including newspapers, photographs and genealogical files.

The Lowell Showboat is docked near the Lowell Dam, and annually presents some of the most famous entertainers in the nation. Both the Girl Scouts of America and the Young Marines own and operate recreational camps for young people along the Flat River. Other recreational activities provided by private sources include golf courses, horseback riding, snowmobile and off-road vehicle racetracks, both Alpine and cross-country skiing, and rental cottages.

C. Public Recreation Facilities